NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

MULCHING
(Acre)

CODE 484

DEFINITION

Applying plant residues, by-products, or other suitable materials produced off site to the land surface.

PURPOSE

- Conserve soil moisture.
- Moderate soil temperature and temporary protection of critical areas.
- Provide erosion control.
- Suppress weed growth.
- Establish vegetative cover.
- Improve soil condition and increase soil fertility.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where mulches are needed. This practice may be used alone or in combination with other practices.

CRITERIA

General Criteria Applicable to All Purposes

The selection of mulching materials will depend primarily on site conditions and the material's availability. Mulch materials shall consist of natural and/or artificial materials such as plant residue, wood bark or chips, by-products, gravel, plastic, fabric, animal manure, rice hulls, and materials from food processing plants or other equivalent materials of sufficient dimension (depth or thickness) and durability to achieve the intended purpose for the required time period.

Mulching is generally performed after grading, soil surface preparation, and seeding and plantings are complete. Soil surface shall be prepared as needed to achieve the desired purpose.

The mulch material shall be evenly applied and anchored to the soil. Tackifiers, emulsions, pinning, netting, crimping, or other acceptable methods of anchoring will be used if needed to hold the mulch in place for specified periods.

Anchor small grain straw and hay mulch with one of the following methods:

Partially press the material into the soil. This can be done with a "packer disk." A packer disk has flat disks that are smooth or serrated, are 20" or more in diameter, and are 8 to 12 inches apart. The edges of the disks are dull enough not to cut the mulch, but press it into the soil leaving much of it in an erect position. A straight finishing disk may be substituted.

Plastic mesh or netting with holes no larger than one inch may be used, especially on unstable soils and in concentrated flow areas. Manufacturer recommendations will be followed to anchor these products.

Mulch spread with special blower-type equipment may be anchored with emulsified asphalt sprayed onto the mulch as it is ejected from the blower or sprayed on the mulch immediately following mulch application.

Apply a homogeneous mixture of 100 gallons of grade SS-1h or CSS-1h emulsified asphalt and 100 gallons of water per ton of mulch. Care shall be taken at all times to protect the public, adjacent property, pavement, curbs, automobiles, sidewalks, signs, and all other structures from asphalt discoloration.

Anchor erosion control blankets, matting, or netting products in accordance with the manufacturer's recommendations.

Anchor black polyethylene film by placing soil on the outer edge.

Wood waste, chips, bark, and sawdust applied on slopes 3:1 and flatter do not need anchoring.

Mulching operations shall comply with federal, state, and/or local laws and regulations during the installation, operation, and maintenance of this practice.

Mulch material shall be relatively free of disease, noxious weed seeds, and other pests and pathogens.

Cover 50 to 100 percent of the surface with mulch material depending on the purpose.

Additional Criteria to Conserve Soil Moisture

Mulch materials applied to the soil surface shall provide at least 60 percent cover to reduce potential evaporation. Mulch material shall be applied prior to moisture loss. Prior to mulching, ensure soil under shallow-rooted crops (immature plants, most legumes) is moist, as these crops require a constant supply of moisture.

Additional Criteria to Moderate Soil Temperature and Mulching for Temporary Protection of Critical Areas without Seeding that may be Subject to Erosion for 6 Months or Less

Mulch materials shall be selected and applied to obtain 100 percent coverage over the area treated. The material shall be of a significant thickness to persist for the period required for the temperature modification.

If grade and shape of the site permits the use of equipment for applying and anchoring mulch materials, select one of the following materials:

Material	Rate/Acre
Small Grain Straw or Hay	2 ½ tons
Wood Waste, Chips, Bark, Sawdust, Etc., on Slopes 3:1 and Flatter	6-9 tons bark (2-3 inches deep)
Erosion Control Blankets, Matting, or Netting Products (Apply in accordance with manufacturer's recommendations.)	To cover 100 percent of the soil surface.
Polyethylene Film	100 percent of Soil Surface (See Heading

CONSIDERATIONS

Additional Criteria to Provide Erosion Control

When mulching with cereal grain straw or grass hay, apply in sufficient amounts to provide at least 70 percent ground cover. Mulch rate shall be determined using current erosion prediction technology to reach the soil erosion objective.

When mulching with wood products such as wood chips, bark, or shavings or other wood materials, apply to a 2-inch thickness if the soil is not well-drained and to a 3- to 4-inch thickness if drainage is good. More finely textured mulches that allow less oxygen penetration than coarser materials should be no thicker than 1 or 2 inches.

Gravel or other inorganic material shall be applied approximately 2 inches thick and shall consist of pieces 0.75 to 2 inches in diameter.

Criteria on the use of mulching materials to aid in the establishment of vegetation on critical areas are provided in the standard for Critical Area Planting (Code 342).

Additional Criteria to Suppress Weed Growth

The thickness of mulch will be determined by the size of the plant being mulched. Small plants must not be smothered. Mulches applied around growing plants or prior to weed seedling development shall have 100 percent ground cover. Thickness of the mulch shall be adequate to prevent emergence of targeted weeds. Plastic mulches may be used.

Use one of the materials given below so that 100 percent of the ground is covered:

Material	Depth
Small Grain Straw or Hay	6-10 inches
Pine Straw	4-6 inches
Wood Wastes (Bark, Etc.)	4-8 inches
Shredded Leaves, Etc.	4-8 inches
Black Polyethylene Film	Completely Cover Area

Note: When using organic mulches on areas established in vegetation, apply an additional 20-30 pounds of nitrogen per acre to offset the tie-up of nitrogen during the decomposition of the mulch.

Additional Criteria to Establish Vegetative Cover

Mulch shall be applied at a rate that achieves 50 to 70 percent ground cover to provide protection from erosion and runoff and yet allow adequate light and air penetration to the seedbed to ensure proper germination, emergence, and disease suppression.

Apply evenly 1 ½ tons of dry straw mulch per acre, 2 tons of dry hay per acre, 3 tons of dry seed-bearing sericea lespedeza hay or native grass hay per acre. Mulch made from wood, paper, or plant fibers (i.e., excelsior, coconut fiber) shall be applied at the rate of 2,000 pounds per acre, or as recommended by the product manufacturer.

Additional Criteria to Improve Soil Condition and Increase Soil Fertility

To increase soil fertility, apply mulch materials with a carbon to nitrogen ratio (C:N) less than 30 to 1 such as animal manure, bio-solids, food processing wastes, or similar materials. Apply other practices such as contouring, filter strips, or riparian forest buffers to assure that runoff from the mulched areas will not transport mulching materials to sensitive water bodies. Do not apply mulch with C:N less than 20:1 to the area of designed flow in water courses.

Credit nutrients applied with the mulch to the nutrient budget.

Use the Soil Conditioning Index to assess soil quality impacts.

CONSIDERATIONS

Consider the effects of mulching on evaporation, infiltration, and runoff. Mulch material may affect microbial activity in the soil surface, increase infiltration, and decrease runoff, erosion, and evaporation. Increased infiltration may increase nutrient and chemical transport below the root zone. The temperature of the surface runoff may also be lowered.

Mulched soil retains moisture, requires less watering, and reduces the chance of water stress on plant materials. Mulch also minimizes evaporation from the soil surface and hence reduces losses from bare soil areas.

Mulch materials high in organic matter with a high water holding capacity and high impermeability to water droplets may adversely affect the water needs of plants.

Clear and infra-red transmissible (IRT) plastics have the greatest warming potential. They are transparent to incoming radiation and trap the longer wavelengths radiating from the soil. Black mulches are limited to warming soils by conduction only and are less effective.

Clear mulches allow profuse weed growth and may negate the benefits of soil warming. Black mulches provide effective weed control. Wavelength selective (IRT) blends the soil warming characteristics of clear mulch with the weed control ability of black mulch.

Consider potential toxic allelopathic effects that mulch material may have on other organisms. Animal and plant pest species may be incompatible with the site.

Consider the potential for increased pathogenic activity within the applied mulch material.

Keep heavy mulches such as shredded hardwood 3 to 6 inches away from plant stems and crowns to prevent disease and pest problems.

Deep mulch provides nesting habitat for ground-burrowing rodents that can chew extensively on bark on tree trunk and/or tree roots. Light mulch applied after the

first cold weather may prevent rodents from nesting.

Annuals and temporary cover seeded alone can be grown to produce mulch for the subsequent perennial planting. See Critical Area Planting standard for recommended rates and dates.

Areas that may not require mulching are:

- Where existing cover will serve desired purpose.
- Rocky or gravelly surfaces that serve the desired purpose.
- In flood-prone areas, the conservationist will determine if mulch will be anchored or not applied.

PLANS AND SPECIFICATIONS

Specifications shall be prepared for each site and purpose and recorded using approved specification sheets, job sheets, technical notes, and narrative statements in the conservation plan or other acceptable documentation. Documentation shall include:

- Type of mulch material used.
- Percent cover and/or thickness of mulch material.
- Timing of application.
- Site preparation.
- Listing of netting, tackifiers, or method of anchoring.
- Operation and maintenance.

OPERATION AND MAINTENANCE

Mulched areas will be periodically inspected, and mulch shall be reinstalled or repaired as needed to accomplish the intended purpose.

Removal, incorporation, bio- or photo-degradation of mulch and associated materials shall be consistent with the intended purpose and site conditions.

Operation of equipment near and on the site shall not compromise the intended purpose of the mulch.

Prevent or replace any fire damage to the mulch material.

Properly collect and dispose of artificial mulch material after intended use.

Monitor and control undesirable weeds in mulched areas.

REFERENCES

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